

In a few instances the monthly precipitation was either the least of record for July or closely approached that quantity. Despite these deficiencies, unusually large amounts were received in a few localities, particularly in the Southwest.

RELATIVE HUMIDITY

The droughty condition, as shown by the deficiency in precipitation, was reflected in the relative humidity,

55/57.5 (08) (73)

SEVERE LOCAL STORMS, JULY, 1929

[The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau]

Place	Date	Time	Width of path, yards ¹	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Clinton County, Iowa	1	3 p. m.			\$4,000	Wind	Details not reported	Official, U. S. Weather Bureau
Nashville, Tenn.	1	6-7 p. m.				Thunderstorm and wind	Considerable damage to property in central and western sections of the city.	Do.
Greencastle, Ind., and vicinity.	1					Wind	Roofs blown off; several barns removed from foundations; corn and hay crops injured. Storm began late June 30.	Do.
Rush and Barton Counties, Kans.	1	P. m.	2,640		75,000	Heavy hail	Damage chiefly to wheat over path 12 miles long.	Do.
Anniston, Ala.	2					Thunderstorm	Trees and windows broken; traffic delayed.	Do.
Plainview, Tex., (near)	2					Hail	Crops damaged.	Do.
Dalton, Nebr., (near)	3	3 p. m.	1,320		15,000	do.	Considerable injury to crops in places. Path 7 miles.	Do.
Carroll County, Iowa	3	6:30 p. m.			100,000	Wind and flood	Damage to property by wind and water equally divided.	Do.
Huron County, Ohio	4	9:30 p. m.	66			Tornadic wind	Damage confined largely to trees over path 1/4 mile long.	Do.
Lincoln, Nebr.	5	2:15-2:30 a. m.	1,760		100,000	Hail and flood	Much damage to buildings; shrubbery stripped; gardens ruined; auto tops punctured. Path 2 miles long.	Do.
Louisa and Henry Counties, Iowa	5	6 p. m.			4,500	Wind	Character of damage not reported	Do.
Springfield, Ill.	5					Tornadic wind	Roofs, trees, garages, and chimneys damaged	Do.
Liberty County, Mont.	6		4-5 mi.			Hail	Crops damaged 10 per cent to total.	Do.
Rotan, Tex.	6		3 mi.			do.	1,500 acres of cotton destroyed.	Do.
Ness, Gray, Meade, Ford, Hodgeman, Haskell, and Finney Counties, Kans.	7	2:30-6 p. m.			328,000	Heavy hail	Much damage to wheat, also minor damage to farm property.	Do.
Mount Vernon, S. Dak. (near)	7	4 p. m.	5 mi.		75,000	Hail and wind	Crops destroyed; poultry killed; farm buildings damaged.	Do.
Farwell, Nebr.	7	4:40 p. m.	3 mi.		10,000	Hail	Considerable loss of crops ready to harvest. Path 6 miles.	Do.
Osceola, S. Dak.	7	5 p. m.	75		5,000	Tornado	Farm buildings wrecked.	Do.
Lincoln and Dawson Counties, Nebr.	7	5:30-6 p. m.	1-3 mi.		10,000	Hail	Total loss of small grain in places. Path 25 miles.	Do.
Wentworth, S. Dak. (near)	7	7 p. m.	2 mi.		50,000	do.	Crops destroyed.	Do.
Goodwell, Okla.	7	7:30 p. m.	1,760		51,000	do.	Extensive damage to crops; other minor injury. Path 7 miles.	Do.
Lamesa, Tex.	7	11 p. m.	2 mi.			do.	10,000 acres of cotton destroyed.	Do.
Cimarron, N. Mex.	8	2 p. m.	2 mi.		10,000	do.	Gardens, orchards, and roofs damaged.	Do.
Wood and Portage Counties, Wis.	8	4 p. m.		3	5,500	Wind, rain, and electrical.	3 men and 8 horses killed by lightning; some property damage by wind.	Do.
Davenport, Iowa and vicinity.	8					Wind and rain	Telephone and power lines broken; traffic impeded; minor injury to crops.	Daily Times (Davenport, Iowa).
Greenville, S. C. (near)	10	3 p. m.			1,500	Thunderstorm	A barn and contents destroyed.	Official, U. S. Weather Bureau
Leola, S. Dak.	10	6 p. m.			10,000	Hail and wind	Crops ruined; buildings damaged or wrecked.	Do.
Berryville, Va., and vicinity.	10		1,320			Heavy hail	Farm crops destroyed over path 2 miles long.	Do.
Reno County, Kans.	11	1:30 a. m.			25,000	Tornado	Damage chiefly in Hutchinson. Much uncut wheat ruined; soda ash plant damaged.	Do.
Saltillo, Tex. (near)	11	4 p. m.				do.	Considerable injury to crops over small area; 1 barn damaged.	Do.
Gurley, Nebr. (near)	11	5:30 p. m.				do.	Practically no damage.	Do.
Thomas County, Kans.	11	10:30 p. m.			1,500	Small tornado	Buildings on 1 farm damaged.	Do.
Devils Lake, N. Dak., and vicinity.	11					Wind, rain, electrical and a tornado.	Many farm buildings wrecked; much damage by tornado at Grand Harbor and Crary.	Do.
El Paso, Tex.	11		1,760		25,000	Cloud-burst	Streets, many residences, and stores damaged by water.	Do.
Mellette, S. Dak. (near)	12	6 p. m.	8 mi.		90,000	Hail and wind	Crops devastated; some damage to buildings.	Do.
Ludington to Muskegon, Mich.	13	A. m.			40,000	Wind and thunderstorm.	Considerable damage by lightning and water; oil barge and contents destroyed.	Do.
Winneshiek County, Iowa	13	4 a. m.				Wind	Heavy crop damage.	Do.
Calhoun Falls, S. C.	13	8-8:40 p. m.			5,000	Wind squall	Property and timber damaged.	Do.
Wayne, Taylor, Tama, Page, Montgomery, Marion, Louisa, Fremont, Dallas, and Adams Counties, Iowa.	14	P. m.			115,000	Wind and floods	Severe crop and property damage.	Do.
Queen Anne County, Md.	14					Electrical	A granary, with contents, and a barn and farm implements burned; livestock killed.	Do.
Windsor, Colo.	15	3:30 p. m.	1,760			Hail	Grain about one-third damaged.	Do.
Memphis, Tenn.	16-17				25,000	Thunderstorm	Many basements and other low places flooded streets damaged.	Do.
Natoma, Kans.	17	7:30 p. m.	4 mi.		2,000	Heavy hail	Some injury to buildings and crops.	Do.
Anniston, Ala.	17			1		Thunderstorm	Stores flooded; traffic impeded.	Do.
Greenville, S. Dak.	17	P. m.	3 mi.		5,000	Wind	Buildings damaged.	Do.
Trumansburg, N. Y.	18	2-3 p. m.	5 mi.		5,000	Hail	Crops injured.	Do.
Artesia, N. Mex.	18	2:30 p. m.	10 mi.			Hail and wind	Crops cut; orchards injured; small buildings blown over.	Do.

¹ Mi. signifies miles instead of yards.

SEVERE LOCAL STORMS, JULY, 1929—Continued

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks	Authority
Locke, N. Y.	18	3:30 p. m.	3 mi.			Hail	Severe damage to roofs, autos, windows, and crops.	Official, U. S. Weather Bureau.
Mexico, N. Y.	18	5 p. m.				do.	Heavy loss to commercial apple crop.	Do.
Richfield, Pa.	18	P. m.				do.	Cornfields leveled, fruit trees and gardens damaged.	Do.
Milwaukee, Wis.	18					Wind	Damage mostly to trees; lake shipping delayed.	Do.
Dickinson County, Kans.	19	12:30 a. m.	3-6 mi.		150,000	Heavy hail	Heavy crop damage over path 30 miles long.	Do.
Sumter-Lee County line, S. C.	19	1:30-2:30 p. m.	880		15,000	Hail	Crops damaged over path 15 miles long.	Do.
Liberty to Easley, S. C.	19	3:30 p. m.			7,500	do.	Crops damaged.	Do.
Clayton and Crawfordville, Ga.	19					Hail and wind	Crops, trees, and roofs considerably damaged.	Do.
Fingerville, S. C.	19		2 mi.		17,500	Hail	Crops damaged over path 4 miles long.	Do.
Lake Preston, S. Dak. (near).	21	9 p. m.			4,000	Wind	A number of small farm buildings wrecked.	Do.
Osceola, Sac. and Webster Counties, Iowa.	23	P. m.				Wind and hail	Crops injured.	Do.
Stoughton, Wis. (near).	23				6,000	Wind	A farm building destroyed; minor crop damage.	Do.
Florence, Ala. (near).	24				5,000	Hail	Corn, cotton, and other crops severely injured.	Do.
Harrisburg, Pa., and vicinity.	24	P. m.				Wind, rain, and electrical.	Damage confined chiefly to power lines; 1 roof blown off.	Do.
Lancaster County, Pa. (northern).	24	P. m.			35,000	Electrical	3 barns destroyed; livestock killed.	Do.
North Point Pleasant, W. Va.	25		83			Wind	2 buildings severely damaged.	Do.
Lamar, S. C. (near).	26	P. m.	1,800		17,500	Hail	Crops injured.	Do.
Delta, Colo.	27	6 p. m.	1,760		25,000	Hail, wind, and rain.	Destruction to crops considerable to total; poultry and livestock injured.	Do.
York Haven, Pa.	29	P. m.			30,000	Electrical	Trolley car destroyed; 1 person hurt.	Do.
Claysville, Pa. (near).	29					Wind and electrical.	Trees uprooted; a barn destroyed; railroad tracks washed out.	Do.

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RIVERS AND FLOODS

By R. E. SPENCER

Discussion of the Lower Mississippi flood of 1929, which was to have been published in this issue of the REVIEW, will appear as a separate paper in the August issue.

Data received too late for inclusion in last month's flood report indicate that the crest stage at Sedgwick, Kans., on the Little Arkansas River, was 18.6 feet at 9 a. m. of June 7, instead of 18.5 feet, as published; and also that the damage for the flood in which this crest occurred was \$8,640, principally to matured crops along the upper reaches of the stream.

Except for a few widely scattered, short, and disastrous floods of the summer-time type caused by excessive rains and overflows from small streams, the only rises of consequence occurring in July were those in central Kansas following the heavy rainfall over that section on July 8-9 and 11. Of these the three most destructive occurred along Cow Creek in Rice and Reno Counties, along the upper Little Arkansas River, and along the Cottonwood and upper Neosho Rivers in Marion, Chase, and Lyon Counties.

The flood along Cow Creek—the most disastrous in the State—continued from the 10th to the 19th, and its losses totaled \$3,750,000. The two largest items of this total were \$1,620,000 in matured crops and \$1,050,000 in tangible property. Hutchinson, Kans., at the confluence of Cow Creek with the Arkansas River, sustained a very large part of this latter item, the flood having been particularly damaging there. Details were of the usual character in most respects—several feet of water in the streets, 75 per cent of the city's buildings flooded, basements filled and stocks of merchandise ruined, voluntary destruction of a section of railroad grading to facilitate drainage from the city, aid from the State militia to prevent looting, successful administration of necessary sanitary measures against possible disease, and energetic rehabilitation. No lives were lost.

Along the Little Arkansas damage was comparatively small—probably not more than \$50,000. The flood began

on the 10th, reached stages exceeding or closely approaching the highest of record in the upper river, was well within its banks by the 16th, and had drained generally from farm lands before the 18th.

The effect of these two floods on the Arkansas River below Hutchinson was slight. Some unimportant overflow occurred, and at Wichita, the confluence of the Arkansas and the Little Arkansas, flood stage was exceeded by 0.8 foot.

Damage done by the floods in the upper Neosho and Cottonwood Rivers, which resulted from the same general rainfall as those in Cow Creek and the Little Arkansas, is estimated at \$866,000, chiefly to growing and matured crops, and exclusive of railroad losses. Bridges and highways were damaged to the extent of \$120,000. An outstanding stage of this flood was that of 36.3 feet at Elmdale at midnight of the 11th, the highest of record at that station.

Other Kansas rises, of less serious consequence, were those in the Smoky Hill Basin. The total loss here was estimated at \$72,750, mostly to crops in Saline County, and, to a less extent, along small streams in Ellsworth County.

The value of Weather Bureau flood warnings in Kansas is estimated at \$48,000, and an additional \$2,000,000 worth of property is said to have been saved in the Cow Creek flood (on which the Weather Bureau has no service above Hutchinson) by the advices of the county engineer.

Other floods included in the tabulation following this report were practically without consequence, except that in North Carolina the high water proved of value to logging interests.

Colorado, and to a less extent the States lying to the east and south, experienced a number of particularly disastrous flash floods during the last two decades of the month. These floods, caused by the extremely heavy and concentrated rains (the so-called "cloud-bursts") of the Rocky Mountain and Great Plains regions, are of course a familiar summer phenomenon; but their unexpectedness of occurrence, as to time and place as well as to the variety and amount of damage they are capable of doing, is a feature against which it is very